

NOXIOUS TIMES

A Quarterly Publication of the California Interagency Noxious Weed Coordinating Committee

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Washington Update

S.144 Signed by President

On October 10, 2004, almost two years after its introduction, Senator Larry Craig's (R-ID) legislation, S.144, was signed by President Bush. The Noxious Weed Control Act of 2004 was signed into law as an amendment to the Plant Protection Act of 2000 under subtitle E.

"This legislation is a product of the persistence and the hard work of many," Craig stated in a press release. "I am very pleased that Congress has acted to recognize the need to provide a more effective method to combat this devastating problem. Noxious weeds destroy our lands, harm wildlife and native species, and interrupt commerce and recreation – and a cooperative private/public partnership to combat them is an effective start to turn the tide on this problem."

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CalWeed Database

CINWCC's Weed Project Database Is Being Revitalized

The California Department of Food and Agriculture and UC Davis' Information Center for the Environment are updating and adding to the CalWeed Database. CalWeed data records are currently housed in the Natural Resources Project Inventory (NRPI) at UC Davis:

www.ice.ucdavis.edu/NRPI

What is the CalWeed Database?

The CalWeed Database offers internet-accessible information on weed control projects in California. Six years ago, the California Department of Food and Agriculture (CDFA) along with UC Davis' Information Center for the Environment (ICE) developed the CalWeed Database with the intention of facilitating information exchange among parties involved in various noxious weed projects throughout the state. This was a joint project started by the California Interagency Noxious Weed Coordinating Committee (CINWCC).

Calweed continued on page 5

Chairperson's Bobbi Simpson, Message National Parks Service

Fiscal year 2004 proved to be yet another exciting and challenging year for the National Park Service Exotic Plant Team of California. Efforts this year focused on partnering with different agencies, expanding our team using volunteers, and improving our data management and analysis.

Through the assistance of a Combined Conservation Initiative grant we were able to partner with the Student Conservation Association (SCA) to significantly expand the capacity of the team. We were able to test the use of a satellite exotic plant team and the value of adding a data manager. This staffing modification allowed for more flexible and numerous treatments and efficient placement of personnel. The addition of a data manager has enabled us to begin synthesizing data as a tool for adaptive management.

The first assignment for the satellite SCA EPMT was a month-long stint at Sequoia and Kings Canyon National Parks. The 4-person crew was provided with precise mapping that guided their methodical reduction efforts to bring fox glove, bull thistle, and mullein under control. The match of this team to the project level was ideal and provided the new crew members an opportunity to experience the inspiration of working to protect Kings Canyon and Grant Sequoia Grove. They inventoried and removed target invasives from over 523 acres in this relatively short period of time. By supplementing the Sequoia-Kings National Park Invasive Species Program with this effort, their base-funded team was able to survey and control invasives on 2600 acres that were recently burned. Without this extra effort, one of the two projects would not have been possible.

In January of 2004, the California EPMT Steering Committee recommended we schedule time to accommodate rapid-response partnership efforts. This shift positioned the team such that we were able to respond to requests from Santa Monica National Recreation Area and Golden Gate National Recreation Area for emergency rehabilitation work on post-fire sites with high infestation potential. The Golden Gate Mt. Tam Fire burned 13 acres of eucalyptus within the wildland-urban interface. As the fire crews felled the partially burned trees, the EPMT followed up with a focused cut-stump treatment. This partnership building on invasive species projects serves as a win-win for fire managers, invasive species managers, neighboring communities, and the resources. The park currently has efforts underway to restore this important area to native oak-grassland habitat.

In year three we have found the program evolving on multiple fronts. As our expertise has grown, parks are seeking out our assistance to help develop long-term strategies for reduction. In a particularly challenging Himalayan blackberry population invading the highly prized Mirror Lake meadow in Yosemite National Park, we have been asked to assist the park with the development of a long-term management strategy and implementation. As each year passes, we hone our strategies through improved planning and assessment of realistic end-products, thereby growing our ability to support parks in their valiant efforts to preserve sustainable, natural ecosystems.

Noxious Times is a publication of the California Interagency Noxious Weed Coordinating Committee. The committee was formed in 1995 when 14 federal, state, and county agencies came together under a Memorandum of Understanding to coordinate the management of noxious weeds. The committee's mission is to facilitate, promote, and coordinate the establishment of an Integrated Pest Management partnership between public and private land managers toward the eradication and control of noxious weeds on federal and state lands and on private lands adjacent to public lands.

The Noxious Times newsletter intends to help the committee achieve its goals of coordination and exchange of information by providing land managers throughout the state with information on weed control efforts, news, and successes.

Noxious Times is published quarterly by staff of the Integrated Pest Control Branch at the California Department of Food and Agriculture. We welcome submissions for our upcoming issues. Please send to: CA Department of Food and Agriculture, ATTN: Noxious Times, 1220 N Street, Room A-357, Sacramento, CA 95814 or e-mail: noxetimes@cdfa.ca.gov

If you have a colleague whose name you would like to add to our mailing list, please send mailing information to the address above.

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Sixth Annual National Invasive Weeds Awareness Week To Kick Off In Washington DC

The Invasive Weed Awareness Coalition is sponsoring the Sixth Annual National Invasive Weeds Awareness Week (NIWAW) from February 27 through March 4, 2005 in Washington, DC. NIWAW brings together groups from across the country to focus national attention on the problems surrounding invasive weeds in the United States. The California Invasive Weed Awareness Coalition (CALIWAC) will be sending a team of dedicated weed warriors to NIWAW to be advocates and do educational work through meetings with Congressional members from California.

During NIWAW VI, briefings will be held with the United States Department of Agriculture and the Department of the Interior leadership and agency administrators on invasive weed awareness and problems. The remaining NIWAW events will also focus on the role that the federal government plays in invasive weed issues. Additional events will include standing exhibits and an evening reception for participants at the United States Botanic Garden Conservatory, a special monthly meeting of the Federal Interagency Committee for the Management of Noxious and Exotic Weeds and Kids Day Activities. For a full listing of the activities, registration fees and further details please visit:

www.nawma.org/niwaw/niwaw_index.htm.

If you are interested in attending, please contact Doug Johnson at djohnson@cal-ipc.org. ♦



Second Annual Invasive Weeds Day at the State Capitol

Last year, the first annual Invasive Weeds Day at the Capitol was a success and this year's event should prove to be just as informative and even more action-packed. The day will include briefings with state agencies, the "how to's" of legislative advocacy, plus meetings with California legislators and their staff.

Armed with great information packets, position papers, and role playing experience, concerned constituents and weed warriors alike will meet with legislators at the state capitol to foster awareness for invasive weed management issues, legislation and funding.



Anyone involved in invasive weed projects in California, including individuals with Weed Management Areas, non-profit organizations, local and county governmental agencies, conservancies and professional organizations are encouraged to meet during the second annual Invasive Weeds Day at the Capitol in Sacramento on Wednesday, March 9, 2005. This event is sponsored by the California Invasive Weeds Awareness Coalition (CALIWAC). This date not only allows for the National Invasive Weeds Awareness Team to return from Washington, DC and report their successes, but also allows more time for a potential California WMA bill to be introduced and assigned a bill number.

Continuing education of California agencies and legislators regarding invasive plant issues is critical. Support materials will be distributed to all participants prior to the event to assist in making meetings as productive as possible. During the morning session, legislative staffers will speak about meeting etiquette, protocol, and logistics. There will be role playing exercises to get participants thinking about and being comfortable with the dynamics of meeting with legislators and staffers.

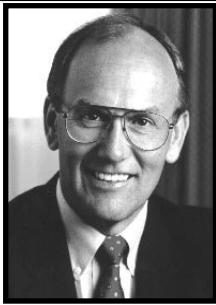
The day's activities will last from 8 a.m. to 5 p.m. The morning will include group meetings with representatives from state agencies to discuss current invasive weed issues and policy. Speakers will also address current invasive weed "talking points" to discuss with legislators. Then all participants will be treated to a scrumptious lunch.

The afternoon will consist of meetings, in teams of two or three, with legislators at the Capitol, which will be arranged ahead of time by CALIWAC. Appointments will be structured such that participants will be meeting with their home legislators, plus other key legislators including urban legislatures and members of the Natural Resources and Appropriations Committees. A wrap-up discussion and summary of meetings will conclude the day's activities.

The "Day at the Capitol" will be an excellent opportunity to educate legislators about invasive weed issues and how these issues affect all Californians. If you have questions or would like to register for the event, please contact Wendy West at (530) 621-5526 or e-mail wendyw@co.el-dorado.ca.us. ♦

Question and Answer with Senator Larry Craig

These questions were asked by Jessica Harris, CDFA to Senator Larry Craig and answered by Mr. Dan Whiting, Press Secretary for Sen. Larry Craig.



Senator Larry Craig (R-ID)

1) Where do you see invasive weed legislation headed in the next 10 years?

To really address the massive problem posed by noxious weeds, the biggest effort must be made at the local level. All stakeholders must organize and reach a consensus to address the common goal of fighting weeds. Congress will continue to propose legislation to battle weeds, but the stakeholders and the States must be the real driving force of motivation.

2) Do you feel that invasive and noxious weeds are not regarded as a threat to the environment and economy of the United States?

I think the average citizen is not aware of the full scope of the problem. We know that just in the West an estimated 70 million acres of federal lands are overrun with noxious weeds. Other estimates say that these weeds are spreading at a rate of 4,600 acres per day. My goal has been to educate the average citizen that it's everyone's problem and my legislation intends to bring all interested parties together in a cooperative manner.

3) Will the House amendments to S.144, specifically the change in administration from the Department of the Interior to the Department of Agriculture, change the goals or focus of the bill?

I do not believe that changing administration authority of the bill will significantly affect the legislation. S. 144 requires the Secretary of Interior to consult with the Secretary of Agriculture. Regardless of who ultimately administers the program, both departments will have to work cooperatively together whether at the top level or on the ground as part of a Cooperative Weed Management Entity (CWME).

4) Have amendments helped the bill gain more support from certain groups, such as the American Farm Bureau Federation and the National Cattlemen's Beef Association (NCBA) that once opposed but now support the bill?

I have worked with various stakeholder groups including the NCBA since the bill's first introduction seven years ago. The amendments adopted by the House Resources Committee reflect the diversity of ideas on how to create a program that effectively fights noxious weeds, but limits bureaucracy while streamlining the process of getting necessary resources to where it will be most effectively used.

5) Is invasive weeds management an important issue to the President, considering his family's ranching background?

The President's administration understands the issue and continues to refine and implement projects among federal agencies to mitigate the effects of noxious weeds on public lands. My legislation adds to this effort by providing incentives that bring federal, state, and local land managers together to fight a common enemy.

6) How will this bill work with the 1996 Plant Protection Act to deal with invasive and noxious weeds?

The two pieces of legislation will complement each other. S. 144 does not stipulate how weeds should be controlled, but provides assistance to groups that voluntarily elect to organize themselves in such a manner that all stakeholders in an area identify their unique priorities. They then can apply for federal funds to accomplish these priorities. Idaho has taken a lead in this endeavor and I hope to allow other states to use this model to combat their specific issues. ♦

S.144 continued from front page...

Both the Senate and the House have made significant amendments to the original text of the bill. In its final version, S.144 appropriates \$15 million per year to fight invasive weed problems through the Department of Agriculture, instead of allocating \$100 million through the Department of the Interior. The amendments also limit federal agency involvement to the Bureau of Land Management and Forest Service.

Looking ahead, programs funded through S.144 will provide a more coordinated and collaborative effort to disburse funds to local weed management areas, public and private entities and representatives from States and Indian tribes so that these groups may carry out projects to control or eradicate noxious weeds on both public and private land.

For more information about S.144 and its original and amended text please visit: <http://thomas.loc.gov/>. ♦

CINWCC UPDATES

Friday, November 5, 2004

Dave Dyer, NRCS

Plant Materials Program as well as Plant Materials Center. Center works with other agencies, like BLM and NPS, on revegetation projects and endangered species recovery projects. They provide agronomic expertise on what is feasible in producing materials for replanting.

The Farm Bill's Conservation Security Program has \$4.2 billion and is on an 8-year cycle, considering 1/8 of the land to be eligible each year. There are three funding levels, with the top being \$45K/year for ten years for a landowner. These are incentives for erosion control, wildlife habitat, IPM measures, etc., and are considered "green payments," not subsidies per international trade agreements. EQIP may be fading away.

Phil Turner, ACE

ACE manages 25 flood control projects in the region, about half of them with camping allowed. The rangers are interested in doing weed control projects when they can, though it's not really part of their mission. Training would be great [CNPS reps offered to provide training at the spring rangers workshop]. They work with the state on hydrilla projects, biocontrol releases, etc.

Cynthia Royce, State Parks

The new Departmental Operations Manual (DOM) has been completed, and it has a much expanded natural resources section, including a section on invasives. She estimates that they have about \$11 million of invasives control work to do annually, and about \$2 million funding. [Steve reminds us that there are some agency estimates of such shortfalls in the appendix of the weed plan.]

Deanne DiPietro, Sonoma Ecology Center & Team Arundo del Norte

TADn has CALFED funding to coordinate data for watershed partners—they currently have ten, mostly in the North Bay. It is estimated that more money is spent to control Arundo than all other invasive weeds combined. At least \$15-\$20 million in the Santa Ana River area alone. Unfortunately this is a short-term (five-year) control plan rather than a long-term eradication plan.

Lia McLaughlin, USFWS/CALFED

New in her position, replacing Roger Buttermore. Part of her job is doing outreach to watershed groups. Recently, the President signed a new bill re-authorizing federal money for CALFED for 2005 through 2010. There is \$389 million identified in the bill for CALFED, but much of that is already spoken for with specific water projects identified in the bill. Actual money available for environmental projects is currently unknown. It's on a three-year funding cycle.

Wendy West, El Dorado County WMA

Their biggest project is surveying the Tahoe basin, which is where the rest of the state was 40 years ago—eradicable, but vulnerable. Lots of opportunities to do outreach to tourists, absentee landowners, etc. A good model for WMA structure, because lots of entities are involved. They have been able to obtain funds from two states.

Don Mayall, CNPS

CNPS members across the state can be a valuable resource, both as knowledgeable eyes in the field, and as advocates. Don is involved in the San Mateo County WMA, and he thinks it's doing great work.

Bob Case, CNPS

Bob, Don, and Jake Sigg are working to energize the CNPS chapters around weed issues. They will visit chapters on request, and encourage them to participate in WMAs. CNPS members can also serve as part of an early detection network. Weed identification workshops and PPTs can also be used to train public agency workers—that are in the field.

Steve Schoenig, CDFA

Biocontrols Division, despite cuts, are continuing some valuable projects, including purple loosestrife, squarrose knapweed, plus renewed research on water hyacinth biocontrol agents, along with the YST rust releases.

Perennial sowthistle was detected in the Lompoc area for the first time. It has been previously noted in Modoc County.

On the aquatic front, hydrilla popped up in a couple of places, but is increasingly hard to find. Clear Lake had none this year. There is a new Limnobium sighting in Shasta.

REPORTS

CALIWAC and California Weed Awareness Day at the Capitol

Wendy West reported on what CALIWAC has been planning: (1) the second annual Weed Day at the Capitol, March 9, 2005 in Sacramento, (2) attendance at the sixth annual National Invasive Weed Awareness Week (NIWAW) Feb. 28-March 3, 2005, (3) an information packet for local groups for California Weed Awareness Week, July 18-24, 2005, and possibly (4) another Sacramento Weed Tour for Legislators in July, 2005.

Cal-IPC

Doug Johnson reported on Cal-IPC's current work. This year's Symposium, held October 7-9 in Ventura, was a success, with over 320 attendees. Major projects continue to be (1) revising the weed list based on new criteria, and (2) working with nurseries and consumers to reduce the introduction of invasive plants through the horticultural trade.

Weed Information Management System (WIMS)

Deanne DiPietro reported on the work of the Cal-IPC Mapping Committee. To join the new listserv, sign up through the webpage at the Cal-IPC website. One of the goals is to provide statewide maps of some of our worst weeds. Through TADn, this is happening now for Arundo.

A useful new tool on the scene, WIMS, has been developed by The Nature Conservancy. It tracks occurrences, assessments, and treatments, and is most useful when implemented with PDAs in the field (though the data structure can be used with other data collections methods). In partnership with TNC, CDFA, and USFWS, the Mapping Committee is evaluating proposed improvements to WIMS, and then they will begin to help disseminating the system to help local groups collect data in a way that can be better aggregated. Deanne estimates that one could get set up with the PDA and ArcPad software for about \$1,000.

S.144 funding

Steve Schoenig reported on the status of WMA funding through S.144. The bill has been signed by the President, so funds are now authorized, but not allocated. USDA has already submitted their 2006 budget, so it may be a while before funding would actually be available. It would be \$15 million/year for several years.

CALIWAC is working on finding an author for a bill to reauthorize state funds for WMAs. This will ideally be ready for the March 9th Invasive Plant Day in the Capitol.

CalWeed Database

Gina Skurka reported on the revitalization of the CalWeed Database, which is designed to maintain records on weed projects across the state, so that people can look up projects in their area, or projects with a similar focus, etc. Some agencies' work and projects have already been entered. When the database was moved to UC Davis/ICE, it was mixed in with other records in a way that made it less accessible. CDFA is working to fix that, and will be making a push for people to add their info to it again.

Next Meeting: We should keep aiming to have a joint meeting with CALIWAC. Our next meeting should be in February, date to be announced. ♦

Calweed continued from front page

Where is the database?

Until recently, the database was an independent entity called CalWeed maintained by Information Center for the Environment (ICE) at UC Davis for CDFA. Currently the CalWeed data has been integrated into ICE's Natural Resources Project Inventory (NRPI) database, where the various weed control project information is stored within a larger and more diverse context among 5,000 state resource stewardship programs. NRPI (CalWeed) can be accessed at:

www.ice.ucdavis.edu/NRPI



How is the database used?

The basic function of the CalWeed Database is to allow groups and individuals to communicate weed project information via a stable web-based exchange structure. The NRPI interface allows for users to search and display projects based on desired attributes, so that only information relevant to the query will be displayed (e.g. county, weed species, herbicide, etc). Try a query by clicking on PROJECT TYPE and then pick "exotic species removal" and your county. This will list projects already in the database.

What are the benefits of CalWeed?

The database allows viewers to search for specific types of weed control projects, to find weed control projects in your area or to view a complete list of projects. As a resource available to all participants, CalWeed data can provide valuable insight into project design, partnership and coordination, implementation and execution.

How do I participate?

Currently, CDFA and UC Davis' ICE are beginning efforts to update the over 700 active weed control projects maintained in CalWeed/NRPI. CalWeed continues to grow and we would like to add your weed control project to the database. Simply print out the instructions at the NRPI homepage and fill out the online project entry form.

For more information on the CalWeed database, please contact CDFA interns, Max Jakovleski at mjakovleski@cdfa.ca.gov or Gina Skurka at gskurka@cdfa.ca.gov. ♦

Water and Weeds

Short Supply; High Demand

The deficit between the demands and the actual water supply in California is a serious matter. Even in drought-free years, there is seldom enough available supply to satisfy the needs of agriculture, the economy and the environment. The unpredictable nature of regional rainfall season-to-season makes efficient distribution of water difficult. Unfortunately, further exploration for alternative supplies is unrealistic because groundwater in the western US is already being withdrawn at unsustainable rates, and continued exploitation of groundwater will ultimately worsen an already precarious situation.

While California's precipitation varies, the amounts of water consumed by individual sectors of the ecosystem remain proportional. On average California receives about 200 million acre/ft of rainfall per year. Approximately 60 percent, or roughly 125M acre/ft of the total incident precipitation will evaporate or be transpired by vegetation, including invasive weeds; leaving roughly 70-75M acre/ft available as runoff or infiltration. In order to supplement demand, extraction adds an additional 145M acre/ft of groundwater; but there is an annual 1-3M acre/ft of overdraft from aquifers that will never fully recharge.

In order for the state to efficiently allocate water resources amidst growing demand by industry and increasing population, groups must engage in comprehensive efforts to ensure the health of California's watersheds and groundwater stores. Stewardship programs increasingly include noxious

weed control as one method to ensure that the majority of available runoff ends up in the aquifers, rivers and reservoirs.

Calculating the aggregate impact noxious weeds have on the water supply is virtually impossible. Many studies have shown that exotic plants transpire more water than California's indigenous flora. If you assume that invasive plants are responsible for 10% of the total annual amount of water transpired by

Many studies have shown that exotic plants transpire more water than California's indigenous plants.

vegetation in California, (roughly 12M acre/ft), that amount comprises about 33 percent of the total water demanded by the California's agricultural industry in 1995. (DWR, 160-98) As the need to efficiently allocate water supplies increases, noxious weed abatement should be an integral component of the resource enhancement structure.

The Root of the Problem

The primary adaptive advantage many noxious weeds enjoy is the ability to exploit resources that are inaccessible to the native species. In stark contrast to crops selectively bred to suit agricultural demands, invasive weeds like leafy spurge (*Euphorbia esula*) have a significant portion of their biomass existing as root (water bearing) tissue as opposed to crops bred for larger fruits and vegetables. This feature allows invasive plants to invest more energy in the exploitation of the soil moisture;

Perennial pepperweed (*Lepidium latifolium*) can sink a taproot to depths of up to 10 feet per year in its search for groundwater (UC IPM website).

In some cases, invasive root systems do not penetrate to a depth where they are able to access the aquifer, but many noxious riparian species still remain a threat to the health of streams. Filamentous roots can facilitate sedimentation by obstructing debris as it moves downstream along the shoreline, constricting the waterway and decreasing flow. The prolific streamside resource glutton, *Arundo donax* shows the grave long-term affects of riparian invasions can result in large single species

communities. Throughout the state, invaders that demonstrate a larger appetite for the constraining resources in the ecosystem are rapidly replacing efficient native vegetation.

Yellow Star Thistle and Water

By virtue of being one of the most prolific weeds in the west, yellow starthistle, or YST (*Centaurea solstitialis*), has been the focus of considerable research involving water use by noxious weeds. YST's rapidly growing taproot is evidence of the tremendous energetic investment in vascular growth by the invasive annual. Ounce for ounce, the weed itself will absorb water at a faster rate than most native plants. In the alluvial soils of the Central Valley, yellow starthistle has been observed to be capable of depleting soil moisture at depths greater than six feet. In the thin soil layers of the foothills, yellow starthistle has been shown to extract moisture from

Water and Weeds

TEXT BY MAX JAKOVLESKI AND MARISA FLORES, CDFA. PHOTOS PROVIDED BY CDFA.



YST in bloom, Photo CDFA

cracks in the bedrock. Aggressive root development throughout the season enables YST to drain moisture away from soil layers where it would be available to localized annual and perennial grasses (Gerlach et al. 1998). Deep taproots and the ability to survive in low soil water content contribute to the unparalleled supremacy of the weed in exploiting crucial resources in relatively dry California grassland. Transpiration estimates per unit are thought to range between 0.3 – 0.6 acre-feet in relatively low concentrations, but average-size infestations of YST have a cumulative impact that entails significant water consumption (Roché et al. 1994).

It is currently estimated that yellow starthistle covers roughly 12 million acres in California, and has completely taken over in 9.9 million acres of Northern California's grasslands (Pimental et al., 2000). In elevations greater than 7,000 feet, the rapid spread of the YST is slowed by a less than optimal growth environment. This leaves the higher portions of California's watersheds largely untouched by the weed, however;

the YST will have a significant impact in any region with a sufficient reserve of sub-surface moisture. Surveys by Pitcairn, O'Connell, and Gendron in 1997 show that epidemic concentrations of YST are found in the Sacramento Valley and the Sierra Nevada foothills. Large populations also inhabit over 500 miles of coastal region from San Luis Obispo to Humboldt County. Yellow starthistle is displacing native grasses in the Central Valley and encroaching upon agricultural water and nutrient reserves (DiTomaso and Gerlach, 2000; Gerlach, 2003).

Salt Cedar and Water

In many parts of the state, the various species of Tamarisk (*Tamarix spp.*), also known as salt cedar, may be exerting significant pressure on a water system that has little excess flow to spare. Due

to the prime riparian niche it occupies, transpiration by salt cedar is believed to be 35% faster than the corresponding rate of most native plants - transpiring a staggering 1.5 acre-feet per year or 325,000 gallons per year (Zavaleta, 2000). On average, a family of four in California utilizes at least one-half of an acre-foot of water a year to satisfy their household consumptive demand (USDA website). Salt cedar is known to be entirely dependent on sub-surface moisture for its water supply of which it can utilize up to 200 gallons per day during the dry season (Hoddenbach, 1987). Salt Cedar infestations also contribute to the salinization of the soil and nearby freshwater because the salt glands of the shrub produce small crystals on the leaf's surface which eventually fall to the ground or into

Ecosystem Service	Lowest Estimate (\$)	Highest Estimate (\$)
Irrigation Water	2.124 billion	6.671 billion
Municipal Water	1.488 billion	3.730 billion
Flood Control	2.860 billion	2.860 billion
Hydropower (Colorado River)	876.5 million	2.402 billion
Wildlife Habitat	85.65 million	360 million
River Recreation	29.17 million	132.1 million
Sedimentation	-71.81 million	-71.81 million
Dove Hunting	-21 million	-21 million
TOTAL	7,331 billion	16,062 billion
Total 55-year value lost per acre	6,318	9,981
Excluding WTP Values	6,219	9,675
Estimated per-acre cost of eradication and revegetation	3,006	3,006
Net Benefit per acre of eradication	3,312	6,975
Net Total Benefit of Eradication	3,483 billion	11,225 billion

Table 1. Summary of fifty-five-year values lost to Tamarix (0 percent discount rate), by Erika Zavaleta, in Invasive Species in Changing World: Mooney and Hobbs.

the water. Additionally, the filamentous rootball of the shrub is believed to enable larger stands of salt cedar to obstruct the flow of streams and rivers. Due to deep rooting the shrub can withstand flooding caused by the increased deposition of sediment trapped by the exposed lateral roots. It is estimated that salt cedar has invaded 90 percent of California's riparian communities (Sala, Smith, and Devitt, 1996). As of 2000, tamarisk covered 16,000 acres in California and 1.5 million acres nationwide (CALFED, 2000).

Giant Reed and Water

Arundo donax, or giant reed, is an invasive perennial grass that thrives along the land-freshwater margins in areas where the soil is either submerged or completely saturated by tidal influences. *Arundo* has a growth rate of about 1.75 inches per day and consumes as much as 530 gallons of water for each yard it gains in height (Bell, 1997). As in the case of most riparian weeds, *arundo*'s proliferation along creeks and canals has been blamed for a subsequent decrease in water flow. The grass originally had been imported to stabilize levee systems and stream banks where the roots form contiguous mats and retain the soil. Dense, monocultural stands of *arundo* share a network of roots that can readily trap sediment in tidally influenced water systems, potentially disrupting the natural flow. *Arundo*'s prime riparian position and virtually non-existent canopy allows sunlight to raise the water temperature, contributing to water loss by evaporation (CALFED, 2000; Bell, 1997; Dudley, 2000). Due to its competitive advantages, *arundo* can be found in abundance in many



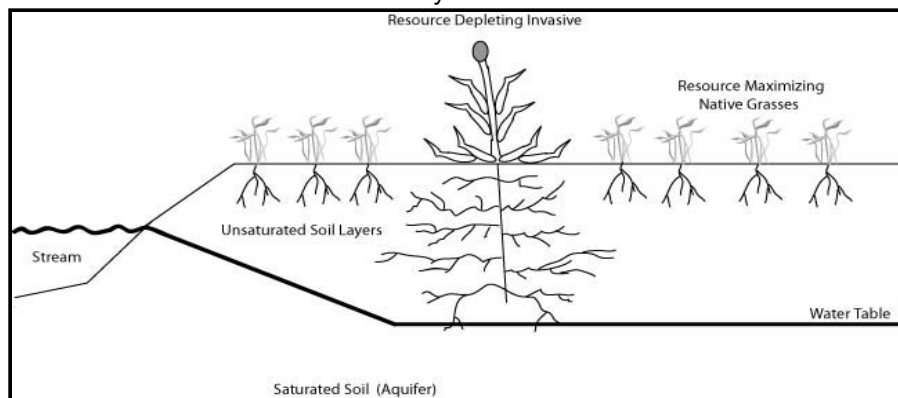
Arundo on Rodman Slough in Lake County, Photo CDEA

low gradient portions of California's river systems, where it crowds out the native willows and cottonwoods. Statewide control is unfeasible judging by the severity and scale of the infestation, but the affects of *arundo donax* on water availability is important due to the proximity of giant reed populations to the industrially important waterways of the Sacramento/ San Joaquin Delta.

Statewide Implications

When the economic impact of noxious weeds on the water system is taken into consideration, it is evident that the long-term benefits of removing invasive weeds outweigh the costs of control. Supplies involved in eradication are expensive and time consuming, but the value of the lost resources can be

even more detrimental to the economy in the long run. In Southern California, salt cedar is responsible for the loss of 1/5 to 1/2 million acre/ft or 68.4 million to 149.9 million gallons. The value of ecosystem services that have been lost to salt cedar over a 55-year period in the western United States are between \$7,000 billion to \$16,000 billion (Table 1, Zavaleta, 2000). The invasive shrub has also negatively impacted indigenous species that had prior to the arrival of saltcedar, benefited from the small ecological niche available to them. Infestation of the Colorado River has resulted in the razorback sucker (*Xyrauchen texanus*), bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*) being placed under higher risk of extinction. Invasive populations of salt cedar have also dried out desert springs used by the threatened Peninsula bighorn sheep, causing a 15-year loss of \$3 million. Invasions into the marsh habitat of the threatened whooping cranes' are responsible for a 55-year loss of \$59 million. Analysis of the lost ecosystem services due to salt cedar infestations have determined that the benefits of eradication could be anywhere from \$3,300 to \$7,000 per acre (Zavaleta, 2000).



Simplified diagram of subsurface water competition.

Successful Watershed Stewardship

Healthy watersheds provide real economic returns to the people and communities who depend on them. In order to maintain a level of ecosystem service that benefits the entire region as a whole, large-scale efforts must be made to eliminate the loss of valuable water supplies to a rapidly growing population of insatiable resource sinks. If there is a likely component of the water budget where California could "trim the fat," without adversely impacting other sectors, it is through the removal of invasive weeds. For years, resource experts have touted the water saving benefits of using drought-tolerant plants in landscaping. The extrapolation of this idea on a statewide scale underscores the importance of noxious weed control to resource conservation. Ultimately, eradication efforts have been

proven successful in safeguarding limited resources after studies have shown that water and stream flow levels have returned to normal after the removal of a pest species. Evidence in South Africa shows that clearing invasive plants had increased stream flow and water levels by 13 percent over the duration of a single growing season (Le Maitre et al., 2000; Prinsloo, Scott, 1999). This rapid system feedback is indicative of the unnecessary stress that invasive plants place on a watershed and most importantly that removing weeds can help conserve precious limited supplies. Despite the seemingly insignificant benefits immediately obtained from individual abatement programs, the overall aggregate effects of weed removal are a positive step towards efficient resource stewardship. Given a large enough scale, regional control efforts can provide a necessary service to both the ecosystem and the economy, safeguarding the one natural resource that has long existed as California's most precious and most limited.



A stand of Arundo established in a rice field in Sutter County, Photo CDFG.

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For a complete list of references, please visit the Noxious Times website, www.cdfa.ca.gov/noxtimes.

TOP TEN DEFINITIONS OF A WEED!

as presented at the
Cal-IPC Symposium
evening program

1. Landscaping for the global village.
2. Nature's weapons of mass destruction.
3. Nature's way of telling you something's wrong.
4. Starbucks of the plant world.
5. Invasive and opportunistic, non-native, non-indigenous, noxious or non-noxious, exotic plants out of place.
6. Those pretty plants you see weird people killing when you're out walking your dog.
7. This is your landscape on drugs.
8. The only thing ranchers and environmentalists agree on.
9. A plant in need of a little TLC -Totally Lethal Control.
10. Job Security!!

AN OVERVIEW OF PONDWEED CONTROL TREATMENTS IN CALIFORNIA

TEXT BY TOM BARR, CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE. PHOTOS PROVIDED BY JOE DITOMASO, UNIVERSITY OF CALIFORNIA, DAVIS.

The genera *Potamogeton*, *Ruppia*, *Stuckenia* and *Zannichellia* are a ubiquitous group of pondweeds present in many of California's waterways (Spencer, Elmore, Ksander and Rocoroni, 2003). The common name, pondweed, is often used to describe several genera of aquatic weeds that are similar in structure, growth, habit and environmental requirements. *Potamogeton* and *Stuckenia* are important genera in the aquatic environment, especially as food or habitat for aquatic animals (R. R. Haynes, 1975). These plants normally are part of a natural native-mixed community in lakes and streams providing food for waterfowl, habitat for aquatic invertebrates, higher fish production, and increased biodiversity¹. While being important to food webs, these plants can also become weeds in irrigation canals, reservoirs, and controlled water structures. *Stuckenia pectinatus* is generally regarded as one of the most pollutant tolerant plants, depending on the nature and type of the pollutant.

Several research studies have investigated the selectiveness of several aquatic herbicides to maintain these native aquatic plants while targeting exotic invasive weeds such as coontail (*Ceratophyllum demersum*) and Eurasian water milfoil (*Myriophyllum spicatum*). Such studies may be useful to weed management approaches that address selective treatment options with *Potamogeton*, *Ruppia*, *Stuckenia* and *Zannichellia*. Where they have become a nuisance, more aggressive control measures are implemented.

Perhaps one of the most challenging issues with pondweeds is identification². Identification is one of the first steps required in an integrated weed management control program. Flower and/or fruit are often required for precise identification. Some species with narrow linear leaves are also difficult to differentiate from *Najas* species without a microscope/field lens. *Potamogeton* has been problematic for many years taxonomically due to highly variable morphology and propensity for hybridization.

This tendency for hybridization from exotic *Potamogeton* introductions can result in the loss of native species genetic integrity (Madsen, Parsons, Hamel and Getsinger, 2001). Flowering occurs May through September, and the flowers are typically inconspicuous and difficult to locate. Management objectives typically include control of excessive pondweed growth or control of other weeds present where pondweeds coexist. Several control methods are presently available to weed managers; these include drawdowns, hand harvesting, dredging, mechanical harvesting, sediment and surface shading, dyes, plant pathogens, biological control and chemical control methods.

Chemical measures typically include the application of aquatic herbicides such as 2,4-D, dichlorobenzil, copper, fluridone, acrolein, and endothall-based treatments, which are discussed below. A novel chemical treatment using acetic acid is also discussed.

Acetic acid is a novel experimental method for treating irrigation canals. Dr. David Spencer at the United States Department of Agriculture's Agricultural Research Service, Exotic and Invasive Weed Research Unit is doing research on this chemical and its use for control of both *Hydrilla* and *Potamogeton* tubers (2002). Although the public's perception of acetic acid, often thought of

as common vinegar, is generally more favorable than for many herbicides such as 2,4 D, this does not necessarily imply that it is environmentally more favorable than another herbicide. In a study on American pondweed (*Potamogeton nodosus*) in the Nevada County Irrigation District near Yuba City, California, no plant production occurred from treated cores (2.5% and 5% solution of acetic acid) while untreated cores produced 20 winter buds per core and biomass of 40 g per core. In this study, 2.5% acetic acid was shown to be as effective as 5% (Spencer, 2002). In this study, the treatment was performed while water was not present in the canal (winter). The California Department of Food and Agriculture (CDFA) is using this method to control *Hydrilla* tubers in its ongoing eradication program near Yuba City, California in an irrigation canal with several species of pondweeds present³. Both timing and placement are important when using this method, but it may prove to be valuable for pondweed tuber control in canals after drawdown.

Acrolein is the most commonly used chemical treatment in irrigation canals in California. Acrolein is used only in non-fisheries water as fish-kills related to leakage into fisheries. It is considered a general biocide. Typical concentrations used for algae, weeds and mollusk vary from 6.0 mg to 10.0 mg per liter. Acrolein has a short half-life in irrigation waters, but it will not kill the tubers and rhizomes embedded in the sediment. A two part follow up similar to the treatment of *Hydrilla* with pelletized fluridone may be useful to treat the tubers and rhizomes. Timing of application could potentially increase the efficacy of tuber, rhizome and turion control, depending on the season. More research is needed.

2,4-D is a restricted-use herbicide licensed by the California Department of Pesticide Regulation that is commonly used in the Sacramento-San Joaquin Delta region for control of water hyacinth. It can lose its efficacy in turbid water conditions (Wells and Clayton, 1993). This issue can cause an increase in cost and treatments needed when using this herbicide. It is also selective for broad leaf dicots versus narrow leaf monocots like the pondweeds (Lembi, 1996 and Madsen, 2000). In a study done on the efficacy of 2,4-D on Eurasian water milfoil, a total of nine species of *Potamogeton* were also treated at Loon Lake, Washington (Madsen, Parsons, Hamel and Getsinger, 2001). Studies on high numbers of *Potamogeton* species suggest that 2,4-D is ineffective over a wide range of species. Further environmental reports from the Virginia State Department of Fish and Game and Westerdahl and Getsinger (1988) suggest poor efficacy for *Potamogeton* using 2,4-D acid.

Dichlorobenzil was considered as a treatment option in a New Zealand efficacy study (Hofstra and Clayton, 2001), and was compared with triclopyr and endothall. At low concentrations (0.5 ppm⁴), the results suggested the impact was ineffective. At higher concentrations, the *Potamogeton* species were susceptible; Walker (1964) and Steward (1980) reported similar results. Presently, the CDFA uses small amounts of this herbicide for alligatorweed control (*Alternanthera philoxeroides*) on dry riverbanks. Typical recommended values are 2 ppm to 3 ppm. Treated water should not be used for livestock, human consumption or irrigation. A 90-day waiting period is required for fish used as food or feed.

Background Photo by Jack Kelly Clark, American Pondweed, *Potamogeton nodosus*

Copper-based herbicide labels often do not list *Potamogeton* as a target species. These copper-based treatments are not labeled for use in New Jersey for seven commonly occurring *Potamogeton* and *Zannichellia* species. Several brands suggest that it is effective for use with *Potamogeton*. Most of the recommendations seem to indicate copper primarily as an algicide but can have some impact on *Potamogeton* species. Water hardness such as calcium carbonate can also influence the impact of copper-based treatments



Photo by Joe DiTomaso, American Pondweed, *Potamogeton nodosus*

and their toxicity on fish and invertebrates. There is also a concern for precipitated copper to accumulate in the sediment and harm benthic invertebrates with repeated usage. Copper can be used in combination with other herbicides synergistically to increase the efficacy of diquat and endothall (Sutton et al., 1970; Yeo and Dechoretz, 1977).

Diquat is not presently used by the CDFA but may be used in the future. Turbidity reduces the effectiveness of diquat (Simsiman, Daniel and Chesters, 1976). Sediment adsorption accounts for 80% to 95% removal of diquat in soil-water experiments. This bound diquat is no longer bioavailable (Simsiman, Daniel and Chesters, 1976; and Reinert and Rodgers, 1987). Photo and microbial degradation are also significant modes of inactivation (Simsiman, Daniel and Chesters, 1976). The effective treatment concentrations of diquat are close to the LC50s (lethal concentrations 50% mortality) for salmon (Lorz et al., 1979). This can be problematic for water regions containing salmon and other sensitive fish. Westerdahl and Getsinger (1988) suggested good efficacy with *Potamogeton* and no listing for *Zannichellia* (horned pondweed).

Fluridone is often used for controlling *Hydrilla* in many weed management regions in California and throughout the United States. Fluridone labels list its usage for pondweed control. While labels may recommend it for pondweeds, there is some dispute in the research on its efficacy for specific pondweed management. It *may* have a significant impact on *Potamogeton* and related families although some researchers have suggested that fluridone has little impact (Madsen, Getsinger, Owens, 2002). Other research has shown a marked decrease in biomass using a fungal pathogen plus fluridone together in combination for *Hydrilla*, yet no impact on American pondweed, *Potamogeton nodosus* (Nelson, Shearer and Netherland, 1998). McCowen et al. (1979) reported excellent control of *Potamogeton* species at 0.25 ppm, 0.5 ppm, 1 ppm, 2 ppm, and 4 ppm even at the lowest dosages. More studies on 2,4-D's use for turion and tuber development on pondweeds are needed. Many studies have looked at using fluridone to target Eurasian milfoil while preserving native pondweeds (Madsen, Getsinger, Owens, 2002). Company labels suggest that control is applicable for pondweeds except for *Potamogeton illinoensis* (partially effective) (SeaPro, 2004).

Endothall is not presently used by the CDFA. Hofstra and Clayton (2001) showed that it did affect *Potamogeton* (a non-target plant) in this particular study but not *Egeria*. This same study also compared

triclopyr and dichlobenil to endothall and showed impacts on *Potamogeton*, while other research discusses the effects of endothall on other species of *Potamogeton* (Wells and Clayton, 1993), (Sprecher et al. 1998, Serns 1977). Netherland et al. (2000) discusses temperature influences on treatment and seasonal timing impacts of endothall on decreasing turion density in *P. crispus*. Even though the efficacy of endothall decreases with decreased temperature,

the effects of early cooler water treatment suggest that early spring/fall treatments are more effective overall on turion production rather than waiting for optimal temperature later in the season. Siseros, Lichwardst and Greene (1998) investigated metered dosing of endothall in high flow canals on sago pondweed (*Stuckenia pectinata*). Their conclusion suggested that this method has good efficacy on this species (97% biomass reduction at 28 days after treatment, while little change occurred with untreated sites in the Idaho study). The dosing rate was 0.4 ppm residual for 84 hours in late summer and further testing showed that this residual was maintained along the 1.6-kilometer channel (Idaho) and a similar treatment in Colorado.

Shading methods are sometimes applicable in smaller site-specific regions. There are varieties of products that are designed for surface shading. Some are denser than water and therefore sink, draping over the existing weed bed. Sand, gravel, clay, plastic, felt, or rubber sheeting can also be used. Numerous research studies suggest that this method is effective in controlling weeds, including specifically *Potamogeton crispus*, in three weeks (Mayer, 1978). The effects of the water chemistry and benthic fauna in response to this method have not been fully investigated. Often, these methods fail for the long-term since the root systems remain, shoots penetrate the barrier, re-infestation from other regions not covered, and sedimentation accumulation on top of these barriers allows formation of a secondary substrate on top of the barrier suitable for new plant growth. This was observed in Nevada County recently with a *Hydrilla* infestation in a rubber-lined fire control pond (CDFA, 2004). There are conflicting reports in the literature of the long-term efficacy of this method, but public perception may warrant its usage over herbicide usage in specific cases.

Dyes have been used for weed control since 1947 by intercepting light as it penetrates the water column. "Aquashade," "Sierra Blue" and "Mariner Blue Pond Dye" are commercially available dye products. These are effective when the water depth is 70 cm or deeper, and applied early in the growing season to increase efficacy. Eicher (1947) used nigrosine to control *Potamogeton crispus* and found it to be effective at depths over two meters. In flow, dilution, aesthetic issues, toxicity to certain organisms, lower dissolved oxygen levels, and other issues need to be considered before implementing their usage.

Pondweeds continued on page 14

Adonis aestivalis: A Newly Recognized Toxic Plant in Hay

TEXT BY LESLIE W. WOODS, CALIFORNIA ANIMAL HEALTH AND FOOD SAFETY LABORATORY SYSTEM SCHOOL OF VETERINARY MEDICINE DAVIS, CALIFORNIA.

Toxic plants have long been a problem for humans and livestock, and are a particular problem when they contaminate feed sources. Over 34 genera in eleven plant families include species known to contain cardiac glycosides, which were introduced into medicine in the late 1800s as cardiac stimulants. Cardiac glycosides are toxic compounds found within the leaves, stems and flowers of certain plants that typically cause digestive disturbances and heart failure if ingested. In North America, plants containing cardiac glycosides most commonly associated with poisoning livestock include oleander (*Nerium spp.*), milkweed (*Asclepias spp.*), and foxglove (*Digitalis spp.*). Other cardiotoxic plants less commonly associated with poisoning livestock include dogbane, lily of the valley, yew, avocado, rhododendron, Star of Bethlehem, periwinkle, hyacinth, death camas and summer adonis (pheasant's eye). Many of the cardiotoxic plants are considered very bitter and unpalatable while fresh, but become more palatable if dried. Additionally, most of these cardiotoxic plants are not typically found in large stands with potential for contaminating large quantities of alfalfa or grass hay. *Adonis aestivalis*, however, has the potential to grow in large stands, and contamination of large quantities of alfalfa or grass hay is possible unless management efforts are undertaken.



Adonis aestivalis, pheasant's eye

scarlet flower grew from his spilled blood. Unfortunately, summer adonis is not a commonly recognized toxic plant. These plants are cardiac glycoside-containing members of the Ranunculaceae family. *Adonis aestivalis* is an annual with

of the western United States (CA, OR, WA, ID, MT, UT), Missouri and New York. *Adonis aestivalis* was documented in Modoc County in northeastern California as early as 1924.

Reports of livestock poisoning due to ingestion of *Adonis* spp. have historically come from its native Europe. However, in the fall of 2002, *Adonis aestivalis* was identified as the cause of heart failure and digestive disturbances in three horses,

the first report of adonis toxicosis in North America. Upon clinical evaluation of these horses, equine veterinary practitioners noted cardiac arrhythmias and gastrointestinal disturbances that were unresponsive to treatment and progressed to severe clinical disease,



Pheasant's eye in a dense stand. Photo by Dale Woods, CDFA



This toxic plant derives its Latin name from the Greek myth in which Aphrodite's ill-fated love, Adonis, was gouged on a hunt by a wild boar, and a

erect stems and terminal, solitary, red-orange and black flowers. Leaves are simple and alternate with blades two or three times pinnately dissected into linear segments. This plant was introduced into North America as a horticultural plant, escaped cultivation and is now abundant in some regions

which necessitated euthanasia. The three horses were necropsied at the California Animal Health and Food Safety Laboratory at University of California (CAHFS), Davis, CA. All three horses had myocardial degeneration and gastrointestinal tract "shut-down."

Adonis continued on page 15

Yellow Starthistle Rust: A new biological weapon to control starthistle

Yellow starthistle is one of the primary weed targets for biological control in the western United States. Six species of insects, all attacking the seedhead, are currently active as biological controls in California and neighboring states. A new type of biological control, this time a plant pathogen, was added to the list of weapons in June 2003.

The plant pathogen, *Puccinia jaceae* var. *solstitialis*, commonly called yellow starthistle rust, is a fungus that attacks the green areas of the plant, principally leaves and stems. Originally collected from yellow starthistle in Turkey during 1978, the disease has been shown to be highly specific to yellow starthistle. Following extensive evaluations, it was approved for release as a biological control in 2003 making it the first plant pathogen to be formally reviewed and approved for release as a biological control of a weed in the continental United States.



YST Occurrence as of 2002

The Biological Control Program of the California Department of Food and Agriculture is coordinating the release and distribution of this new biological control agent. The first release of the rust was an experimental field release in an isolated valley in Napa County, early in July 2003. The second release, in a Sacramento greenhouse, was designed to be the first step in a cooperative program to spread the rust statewide on yellow starthistle.

Yellow starthistle plants grown in greenhouse pots are inoculated with the rust and spores are harvested and stored for future field releases. This 'rust farm' has been highly successful, producing enough spores in nine months to inoculate 25 field plots in 20 counties during spring 2004.

Statewide distribution of the rusts is handled on the existing distribution process used by CDFAs' Biological Control Program. Efforts are focused in two directions; 1) statewide

TEXT AND PHOTOS BY DALE M. WOODS AND BALDO VILLEGAS, CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE.



Pustules of rust spores appeared three weeks after inoculation in El Dorado County. Photo by Dale Woods.

distribution of the rust, and 2) monitoring for establishment and impact. A series of workshops were conducted in the field in which biologists from the county Agriculture Commissioners Offices were trained about the biology of the rust inoculation techniques and the long term monitoring procedures. Biologists were then provided with a sample of the rust and all the equipment needed to make the releases on secure plots of yellow starthistle.

A total of 27 release sites were selected, spread among 20 counties for the 2004 inoculations. Approximately three weeks after the inoculations, new spores of the rust had appeared on the surface of the inoculated leaves. These spores are the progeny and method of spread of the rust. They are capable of being blown many miles to deposit on the surface of new starthistle plants.

Another round of inoculations will occur in 2005, probably in March. Priority will be given to new sites selected in counties that have not had a release in 2004. Additional sites will also be selected to ensure that a diversity of habitats will be tested to see if the rust is more effective under select local conditions.

The second goal of monitoring for impact and spread of the rust will be continued and even expanded in 2005 as the rust

Yellow starthistle continued on page 15



A field workshop in Sonoma County with county biologists to distribute and inoculate the rust. Photo by Dale Woods.

Pondweeds continued from page 11

Hand harvesting is expensive and therefore generally used in intensive localized areas. It has been effective at the CDFA in conjunction with chemical controls in a small canal containing a mixture of *Hydrilla*, *Zannichellia*, *Stuckenia* and *Potamogeton* located near Yuba City (CDFA, 2004). The agricultural and ecological impacts are reduced in sensitive regions compared to other forms of treatment.

Draw-down methods are effective in many weed species, but *Potamogeton* forms tubers that are resistant to temporary drying. Numerous limnological issues arise when considering a draw-down such as increases in turbidity, increases in chlorophyll *a*, decreases in oxygen levels, and higher nutrient levels and algal blooms upon re-flooding. Many regions in California have naturally occurring draw-downs, due to the water level seasonality, keeping many reservoirs weed free most of the year.

Dredging is done to remove the infested rooted portion of the sediment. *Potamogeton* tuber production may warrant dredging in some cases for control. It will also export nutrients and the physical substrate for the roots to attach; this removes the tuber bank, similar to removing the seed bank in terrestrial systems.

Mechanical harvesting of *Potamogeton* is seldom done for control but rather for cosmetic appearances at the water surface and for removal of plants interfering with fishing, boating, and swimming. Many non-target organisms are killed in this process, up to 30% of a fish population (Haller et al., 1990). This method is most often used for floating plants such as water hyacinth.

Biological control of *Potamogeton* typically consists of the sterile triploid grass carp (Sanders et al., 1991). These fish are considered moderately effective at controlling pondweeds in various studies on aquatic weed control (Sanders et al., 1991). Other studies have looked at *Tilapia zillii* on *Stuckenia* in southern California irrigation canals (Legner and Fisher, 1980).



Photo by Joe DiTomaso, Curlyleaf pondweed, *Potamogeton crispus*

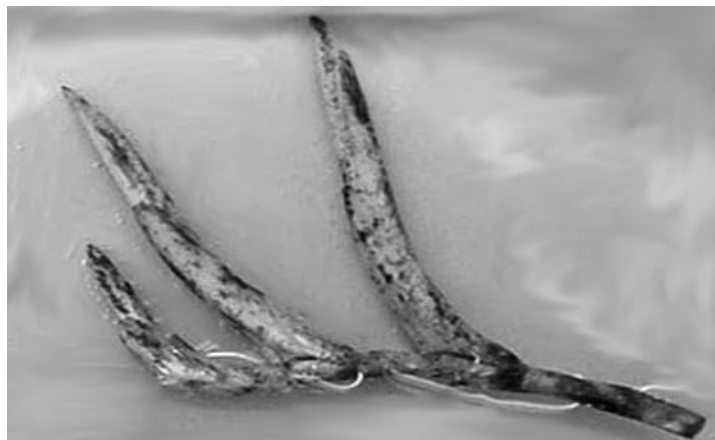


Photo by David Spencer, pondweed tubers

Stuckenia became scarce but was never considered a problem weed in these canals. Several studies have looked into the potential for fungal pathogens but field studies have not found significant effects (Shearer, 1993).

The management of pondweeds tend to fall into two main groups: 1) selective control of non native weeds leaving the pondweed populations intact, and 2) control of pondweeds, mostly in irrigation canals. *Potamogeton* and its relatives are often part of the native vegetation and perform a vital role in natural ecosystems, even preventing more invasive exotic weeds from taking hold. The treatments options vary widely as do the species and their susceptibility. The right method for the weed management region depends on the plant and the use, but having more options and tools for control is helpful to weed managers. More research is needed for mapping the native *Potamogeton* and related genera, determining tuber and turion densities in weed infested regions, comparing the efficacy on California waterways environment, and the treatment options on agriculture. ♦

Pondweeds FOOTNOTES

¹ *Potamogeton crispus* is considered the only non native pondweed present in California, according to the Jepson Manual.

² There are roughly eighteen recognized species in these two pondweed families (*Potamogetonaceae* and *Zannichelliaceae*) according to *Aquatic and Riparian Weeds of the West* (Di Tomaso and Healy, 2003), which is an excellent reference for weed managers needing information concerning aquatic plant management and identification.

³ A test is being conducted under a Research Authorization issued by the California Department of Pesticide Regulation.

⁴ ppm = parts per million = milligrams per liter.

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For a complete list of references, please visit the Noxious Times website, www.cdfa.ca.gov/noxtimes.

Adonis continued from page 12

Alfalfa hay that the horses had ingested was also submitted to the laboratory for analysis and was found to contain small amounts of *Adonis aestivalis*. The gastrointestinal contents from all three horses were then analyzed and found to contain strophanthidin, the toxic cardenolide found in *Adonis aestivalis*, confirming ingestion of the plant. In the summer of 2003, tissues from a Nevada horse that died after ingestion of hay contaminated with *Adonis aestivalis* were submitted to CAHFS. Strophanthidin was identified in the gastrointestinal contents from this horse. *Adonis aestivalis* was identified in the hay, which came from California.

Horses poisoned by summer adonis commonly display signs of gastrointestinal disturbance or colic, a very common clinical syndrome. Many of these horses are euthanized without subsequent necropsy examination. Currently, CAHFS is the only diagnostic laboratory in the

country that has the capability to test for strophanthidin as a validated diagnostic test even though various species of this genus are distributed throughout the country.

In addition to horses, these plants appear to be toxic to other livestock, but data is limited. With publication of clinical cases and experimental toxicity studies, adonis may be better recognized by veterinarians, diagnosticians, farm advisors and extension specialists across the country, and a better awareness of the prevalence of this toxicosis is possible. Reports of poisonings in livestock by *Adonis aestivalis* may become more common as more recognition is given to this plant, and this plant becomes better established (naturalized) in the western region of North America. Inclusion on the state noxious weed list would prevent this toxic plant from being mixed with certified weed free forage once the program is operational. ♦

References

Woods LW, Filigenzi MS, et. al. Summer pheasant's eye (*Adonis aestivalis*) poisoning in three horses. *Veterinary Pathology* 41:215-220 (2004).
 USDA Plants Profile: http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=ADAE
 FDA Poisonous Plant Database: <http://www.cfsan.fda.gov>

Yellow starthistle continued from page 13

is released in diverse climates. County biologists and others are encouraged to monitor statewide for rust pustules and report results back to CDFA.

There was very little natural spread of the rust in 2004 but extensive spread in anticipated for early in 2005. The rust has the potential to spread hundreds of miles in a season if conditions are appropriate. Even with limited natural spread, the distribution efforts by the biological control program will move the rust throughout the state. Pustules of the rust will soon become a part of the damage to yellow starthistle, hopefully contributing to a level of control. ♦



Shasta County Biologist Kevin Martyn inoculates a plot of yellow starthistle. Photo by Dale Woods.

Question: Where can you get the latest on weed control biotechnology, learn about ancient weeds and watch the passing of the short-handled hoe... all within a stones-throw of the beautiful Pacific surf?

Answer: The 57th annual conference of the California Weed Science Society!

It's almost CWSS Conference time again and the 2005 gathering in Monterey promises to be something that weed folks won't want to miss. The conference, running January 10 – 12, will be a great place to meet up with old friends, catch up on the latest research and new product buzz, and snag up some continuing education hours. As always, CWSS works hard at keeping its membership in the know about important issues; that's why *Biotechnology and Weed Science* was chosen as the theme of the upcoming conference. Attended by weed management professionals from agriculture, the landscape and golf course industries and dozens of public agencies, the CWSS truly delivers on its promise to be **THE** premier source of information on weed biology and management in California.

If you've never been to the CWSS Conference, what are you waiting for? Mark your calendars for January 10 – 12 and we'll see you in Monterey! www.cwss.com

Tool Box:

GRASS IDENTIFICATION CD

The Grass and Grass-like Weeds of California is a computer-based diagnostic resource for the identification of 206 weedy grass, sedge, rush and cattail species. It allows the user to choose from a number of vegetative and reproductive characteristics to accurately identify species in the seedling, vegetative or mature stages of growth. A description and several photos or illustrations are included for each species. The program costs \$30 plus tax and shipping.

See www.caweeds.com or contact Joe DiTomaso at 530-754-8715 for more details.

UPCOMING EVENTS

February 7-10, 2005

Annual Meeting: Weed Science Society of America

Sheraton Waikiki, Honolulu, Hawaii

www.wssa.net

May 7-8, 2005

Jepson Herbarium Classes: Poecia

Valley Life Sciences Building, UC Berkeley

Taught by Travis Columbus

<http://ucjeps.berkeley.edu/jepwkshp.html>

May 25-27, 2005

International Workshop: Invasive Plants in the Mediterranean Type Regions of the World

Montpellier, France

www.ame-lr.org/workshop

June 25-26, 2005

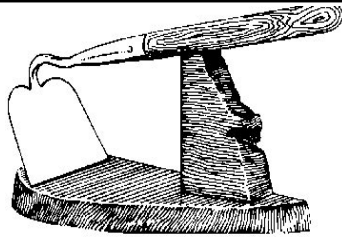
Jepson Herbarium Classes: Thistles: The Good, The Bad, and The Beautiful

Field regions in the greater Bay Area

Taught by Dean Kelch

<http://ucjeps.berkeley.edu/jepwkshp.html>

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The California Weed Science Society

<http://www.cwss.org>

Annual Conference "Biotechnology & Weed Science"

January 10-12
Portola Plaza Hotel
at Monterey Bay
Two Portola Plaza
Monterey, California

Featured Sessions:

Turf, Ornamental, Exhibits and Posters, Trees & Vines,
Industrial & Aquatics, Agronomic Crops, Laws & Regs,
Forest, Range and Wildlands, Vegetable Crops, What's
New, and Weed Of The Year

DPR Hours Approved:

18.5 total hours applied for (2.5 laws and regulations)

To register, please contact CWSS at (831) 442-0883 to request a registration form or to pay by VISA/MC.

To make hotel reservations contact the Portola Plaza Hotel at Monterey Bay at (888)222-5851.

58th Annual Meeting Western Society of Weed Science

March 8 - 10, 2005

Hyatt Hotel

Vancouver, British Columbia

Keynote Speaker: Neil Harker

*Topics Covered: dose-response
functions, future of crop protection,
chemistry versus genetic engineering*

**For registration information
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